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(54) **Multilayer container**

Mehrschichtiger Behälter

Conteneur multicouche

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Description

[0001] The present invention is directed to multilayer containers, and more particularly to containers that comprise a relatively rigid outer plastic body and a relatively flexible inner plastic liner.

Background and Summary of the Invention

[0002] It has heretofore been proposed to provide a container in the form of a relatively rigid outer plastic body and a relatively flexible inner plastic liner. The container body has a dispensing opening at one end and an atmospheric vent at the opposing end. The inner liner is coupled to the dispensing opening. When containers of this type are employed in conjunction with pump or spray dispensers, for example, the inner liner delaminates from and collapses within the outer plastic body as product is dispensed, with air entering through the atmospheric vent between the outer body and the collapsing liner.

[0003] Such a multilayer container is known from US 5 407 629 A.

[0004] As the liner collapses when the product is dispensed, stress cracks or pinholes can appear along the folds and creases of the liner, causing product leakage and loss. It is therefore a general object of the present invention to provide a multilayer container of the subject type in which the liner readily delaminates from the relatively rigid plastic body as product is dispensed, in which the liner provides not only improved barrier properties but also improved flexibility for elimination of stress cracks and pinholes. Another object of the present invention is to provide a container of the subject type that exhibits reduced product weight loss as compared with structures in the prior art. Yet another object of the invention is to provide a multilayer container of the described character that employs plastic regrind in the container package to promote recycling of moils and scrap.

[0005] A multilayer container for dispensing product includes a relatively rigid outer plastic body and a relatively flexible inner plastic liner for holding product to be dispensed. The multilayer container of the invention is characterised by the features of claim 1. In accordance with one aspect of the present invention, the relatively rigid outer body includes, and preferably consists essentially of, an outer layer of virgin polyethylene such as HDPE, and an inner thicker layer that includes process regrind. In accordance with another aspect of the invention, the relatively flexible inner liner includes, and preferably consists essentially of, an outer delamination layer adjacent to the inner layer of the body and composed of nylon, nylon blends or EVOH, an inner layer of polyethylene such as LLDPE, and an adhesive securing the inner and outer layers of the liner. The relatively thin outer HDPE layer on the plastic body provides desired appearance, while the thicker inner layer provides struc-

tural rigidity using reground plastics. The nylon, nylon blend or EVOH outer liner layer provides improved barrier properties against migration of water, gases and flavorants, while the inner layer of LLDPE provides enhanced flexibility, freedom from cracking and additional barrier properties.

Brief Description of the Drawings

[0006] The invention, together with additional objects, features and advantages thereof, will be best understood from the following description, the appended claims and the accompanying drawings in which:

FIG. 1 is an elevational view of a multilayer container in accordance with a presently preferred embodiment of the invention;

FIG. 2 is a top plan view of the container illustrated in FIG. 1;

FIG. 3 is a bottom plan view the container illustrated in FIG. 1;

FIG. 4 is a sectional view taken substantially along the line 4-4 in FIG. 2;

FIG. 5 is an enlarged fragmentary sectional view of the portion of FIG. 4 within the circle 5;

FIG. 6 is an enlarged fragmentary sectional view of the portion of FIG. 4 within the circle 6; and

FIG. 6A illustrates delamination of the structure illustrated in FIG. 6.

Detailed Description of Preferred Embodiments

[0007] The drawings illustrate a container 10 in accordance with a presently preferred embodiment of the invention as comprising a relatively rigid outer plastic body 12 and a relatively flexible inner plastic liner 14. Body 12 has a dispensing opening 16 surrounded by a container finish 18 at one end of the body, and an atmospheric vent 20 disposed at the opposing end of the body. Inner liner 14 communicates with opening 16 at finish 18 of container body 12, and is otherwise closed to prevent ingress of air. Vent 20 comprises a slot that extends diametrically across the lower end or bottom of container 12, being formed by the tearing away of the tail of the molded plastic body when the molds start to open after the bottle has been made.

[0008] To the extent thus far described, container 10 is similar to that disclosed in U.S. Application Serial No. 08/807,944 assigned to the assignee hereof and incorporated herein by reference for purposes of background. When a pump or spray dispenser is secured to container finish 18, product within liner 14 can be dispensed by operation of the pump or spray dispenser. As product is dispensed, negative pressure within liner 14 causes liner 14 to separate from container body 12. Atmospheric air enters vent 20 to permit such separation. Thus, the liner collapses as the product is dispensed, while body 12 retains its original configuration due to its

inherent rigidity as well as separation of the liner from the inner surface of the body. Container 10 preferably is manufactured by a co-extrusion and blow molding process of the type illustrated in U.S. Patents 3,781,395, 3,767,747 and 3,978,184.

[0009] In accordance with the present invention, relatively rigid outer plastic body 12 includes, and preferably consists essentially of, a thin outer layer 22 and a thicker inner layer 24. Likewise, liner 14 in accordance with the present invention includes, and preferably consists essentially of, an outer layer 26 and an inner layer 28. These layers are formed in an otherwise conventional co-extrusion and blow-molding operation, such as those disclosed in the U.S. patents cited immediately above. Outer layer 22 of container body 12 preferably consists of high-density polyethylene (HDPE) and has a thickness not greater than 0,10 mm (0.004 inches). Inner layer 24 of container body 12 preferably comprises 70% virgin HDPE and 30% process regrind (i.e., regrind of HDPE, LLDPE, nylon, nylon blend or EVOH, and previous regrind from process spoils and scrap). Inner layer 24 preferably has a thickness in the range of 0,15 to 0,51 mm (0.006 to 0.020 inches). Thus, outer layer 22 provides the desired appearance to the overall container, while inner layer 24 provides structural rigidity using regrind materials.

[0010] Outer layer 26 of liner 14 preferably is of composition selected from the group consisting of nylon, nylon blends and EVOH, having a thickness in the range of 0,05 to 0,10 mm (0.002 to 0.004 inches). Inner layer 28 preferably comprises linear low density polyethylene (LLDPE), having a thickness in the preferred range of 0,05 to 0,10 mm (0.002 to 0.004 inches). Liner 14 also includes an adhesive, which preferably is blended with the LLDPE material of inner layer 28 in a ratio of 80% virgin LLDPE to 20% adhesive. This adhesive secures inner layer 28 to outer layer 26. Alternatively, the adhesive may be provided in the form of a thin layer between layers 26, 28, which would use less adhesive material and prevent contact between the adhesive material and the product contained within liner 14. The nylon, nylon blend or EVOH composition of outer layer 26 provides ready delamination of liner 14 from container body 12, and also provides a barrier against loss of product, gas migration or loss of product flavorants. The LLDPE material of inner liner 28 provides high flexibility while resisting formation of stress cracks and pinholes as liner 14 collapses.

[0011] Tests have been conducted on containers in accordance the present invention using a crystalized nylon material in layer 26 and a liquid soap product. Projected annual product loss was 0.1% at 23°C (73°F), 1.3% at 38°C (100°F) and 2.5% at 49°C (120°F).

[0012] It will therefore be recognized that a multilayer container has been provided in accordance with the present invention, which fully satisfies all of the objects and aims previously set forth. The two-layer construction of the inner liner or bag 14 provides improved barrier

properties while eliminating stress cracks and pinholes. The two-layer construction of the liner 14 also provides improved flexibility and strength. The overall container exhibits a reduced annual product weight loss. No pre-delamination is required between the liner and container body when product is dispensed. Process regrind is recycled into the package. The process does not need to use nitrogen as support air.

Claims

1. A multilayer container for dispensing product which comprises:
 - a relatively rigid outer plastic body (12) and a relatively flexible inner plastic liner (14) for holding product to be dispensed, **characterised in that**
 - said relatively rigid outer body (12) includes an outer layer (22) of virgin polyethylene, and an inner layer (24) thicker than said outer layer and including process regrind;
 - said relatively flexible inner liner includes an outer layer (26) adjacent to said inner layer of said body and composed of barrier material that does not adhere to said body, and an inner layer (28) of polyethylene.
2. The container set forth in claim 1 wherein said inner liner (14) includes an adhesive bonding said inner layer (28) of said liner to said outer layer (26) of said liner.
3. The container set forth in claim 2 wherein said adhesive is blended with said polyethylene of said inner layer (28) of said liner.
4. The container set forth in claim 2 or 3 wherein said outer layer (26) of said liner (14) is selected from the group consisting of nylon, nylon blends and EVOH.
5. The container set forth in claim 2, 3 or 4 wherein said inner layer (28) of said liner (14) comprises LLDPE.
6. The container set forth in any preceding claim wherein said inner and outer layers (28, 26) of said liner (14) each have a thickness in the range of 0,05 to 0,10 mm (0,002 to 0,004 inches).
7. The container set forth in claim 6 wherein said outer layer (26) of said liner (14) is selected from the group consisting of nylon, nylon blends and EVOH, and wherein said inner layer of said liner (28) comprises LLDPE.

8. The container set forth in any preceding claim wherein said outer layer (22) of said body (12) is virgin HDPE, and said inner layer (24) of said body is comprised of virgin HDPE and process regrind.
9. The container set forth in claim 8 wherein said inner layer (24) of said body (12) is 70% virgin HDPE and 30% process regrind.
10. The container set forth in claim 8 wherein said outer layer (22) of said body (12) is not more than 0,10 mm (0.004 inches) thick, and said inner layer (24) of said body is in the range of 0,25 to 0,51 mm (0.010 to 0.020 inches) thick.
11. The container set forth in any preceding claim wherein said relatively rigid outer body (12) has a dispensing opening (16) at one end and an atmospheric vent (20) at an opposing end, and said relatively flexible inner liner (14) opens at said dispensing opening.

Patentansprüche

1. Mehrschichtiger Behälter zur Abgabe von Produkt, umfassend:

ein relativ steifer äußerer Kunststoffkörper (12) und
eine relativ flexible innere Kunststoffauskleidung (14), um das abzugebende Produkt zu halten,

dadurch gekennzeichnet,
dass der relativ steife äußere Körper (12) eine äußere Schicht (22) aus jungfräulichem Polyethylen und eine innere Schicht (24) aufweist, die dicker als die äußere Schicht ist und Recyclingmaterial umfasst;
dass die relativ flexible innere Auskleidung eine äußere Schicht (26) benachbart der inneren Schicht des Körpers aufweist und aus Sperrmaterial zusammengesetzt ist, welches nicht an dem Körper haftet, und eine innere Schicht (28) aus Polyethylen besitzt.

2. Behälter nach Anspruch 1,
dadurch gekennzeichnet, dass die innere Auskleidung (14) einen Klebstoff aufweist, der die innere Schicht (28) der Auskleidung an die äußere Schicht (26) der Auskleidung bindet.
3. Behälter nach Anspruch 2,
dadurch gekennzeichnet, dass der Klebstoff mit dem Polyethylen der inneren Schicht (28) der Auskleidung gemischt ist.

4. Behälter nach Anspruch 2 oder 3,
dadurch gekennzeichnet, dass die äußere Schicht (26) der Auskleidung (14) aus der Gruppe bestehend aus Nylon, Nylonmischungen und EVOH ausgewählt ist.

5. Behälter nach Anspruch 2, 3 oder 4,
dadurch gekennzeichnet, dass die innere Schicht (28) der Auskleidung (14) LLDPE umfasst.

6. Behälter nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass die inneren und äußeren Schichten (28, 26) der Auskleidung (14) jeweils eine Dicke im Bereich von 0,05 bis 0,10 mm (0,02 bis 0,004 Zoll) aufweisen.

7. Behälter nach Anspruch 6,
dadurch gekennzeichnet, dass die äußere Schicht (26) der Auskleidung (14) aus der Gruppe bestehend aus Nylon, Nylonmischungen und EVOH ausgewählt ist und dass die innere Schicht der Auskleidung (28) LLDPE umfasst.

8. Behälter nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass die äußere Schicht (22) des Körpers (12) jungfräuliches HDPE ist und dass die innere Schicht (24) des Körpers aus jungfräulichem HDPE und Recyclingmaterial zusammengesetzt ist.

9. Behälter nach Anspruch 8,
dadurch gekennzeichnet, dass die innere Schicht (24) des Körpers (12) 70% jungfräuliches HDPE und 30% Recyclingmaterial enthält.

10. Behälter nach Anspruch 8,
dadurch gekennzeichnet, dass die äußere Schicht (22) des Körpers (12) nicht mehr als 0,10 mm (0,004 Zoll) Dicke aufweist und dass die innere Schicht (24) des Körpers im Bereich von 0,25 bis 0,51 mm (0,010 bis 0,020 Zoll) dick ist.

11. Behälter nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass der relativ steife äußere Körper (12) eine Abgabeöffnung (16) an einem Ende und eine Belüftungsöffnung (20) am entgegengesetzten Ende aufweist und dass sich die relativ flexible innere Auskleidung (14) zur Abgabeöffnung hin öffnet.

Revendications

1. Récipient multicouche pour distribuer un produit, qui comprend :

- un corps extérieur en plastique relativement rigide (12) et une chemise intérieure en plastique relativement souple (14) pour contenir le produit à distribuer, **caractérisé en ce que** ledit corps extérieur relativement rigide (12) comprend une couche extérieure (22) en polyéthylène vierge, et une couche intérieure (24) plus épaisse que ladite couche extérieure et comportant de la matière rebroyée ; ladite chemise intérieure relativement souple comprend une couche extérieure (26) adjacente à ladite couche intérieure dudit corps et composée d'un matériau barrière qui n'adhère pas audit corps, et une couche intérieure (26) en polyéthylène.
2. Récipient selon la revendication 1, dans lequel ladite chemise intérieure (14) comporte un adhésif qui lie ladite couche intérieure (28) de ladite chemise à ladite couche extérieure (26) de ladite chemise.
3. Récipient selon la revendication 2, dans lequel ledit adhésif est mélangé audit polyéthylène de ladite couche intérieure (28) de ladite chemise.
4. Récipient selon la revendication 2 ou 3, dans lequel ladite couche extérieure (26) de ladite chemise (14) est choisie dans l'ensemble comprenant le nylon, les mélanges de nylon et l'EVOH.
5. Récipient selon la revendication 2, 3 ou 4, dans lequel ladite couche intérieure (28) de ladite chemise (14) comprend du PEBDL.
6. Récipient selon l'une quelconque des revendications précédentes, dans lequel lesdites couches intérieure et extérieure (28, 26) de ladite chemise (14) ont chacune une épaisseur comprise dans la plage allant de 0,05 à 0,10 mm (0,002 à 0,004 pouce).
7. Récipient selon la revendication 6, dans lequel ladite couche extérieure (26) de ladite chemise (14) est choisie dans l'ensemble comprenant le nylon, les mélanges de nylon et l'EVOH, et dans lequel ladite couche intérieure de ladite chemise (28) comprend du PEBDL.
8. Récipient selon l'une quelconque des revendications précédentes, dans lequel ladite couche extérieure (22) dudit corps (12) est en PEHD, et ladite couche intérieure (24) dudit corps est constituée de PEHD vierge et de matière rebroyée.
9. Récipient selon la revendication 8, dans lequel ladite couche intérieure (24) dudit corps (12) est faite de 70 % de PEHD vierge et de 30 % de matière rebroyée.
10. Récipient selon la revendication 8, dans lequel ladite couche extérieure (22) dudit corps (12) ne fait pas plus de 0,10 mm (0,004 pouce) d'épaisseur, et ladite couche intérieure (24) dudit corps fait entre 0,25 et 0,51 mm (0,010 à 0,020 pouce) d'épaisseur.
11. Récipient selon l'une quelconque des revendications précédentes, dans lequel ledit corps extérieur relativement rigide (12) comporte une ouverture de distribution (16) en une extrémité et un évent à l'air libre (20) en une extrémité opposée, et ladite chemise intérieure relativement souple (14) s'ouvre au niveau de ladite ouverture de distribution.

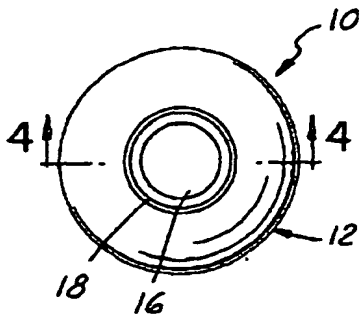


FIG. 2

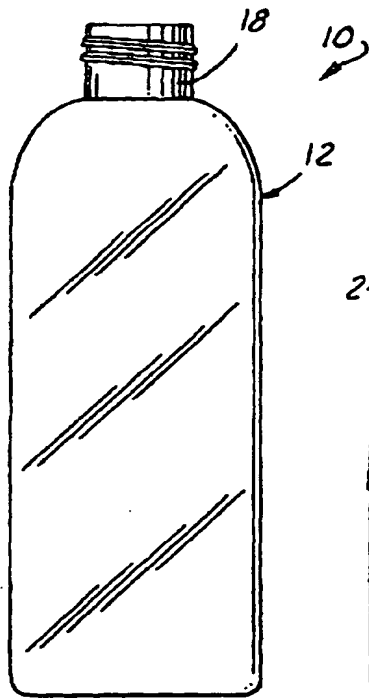


FIG. 1

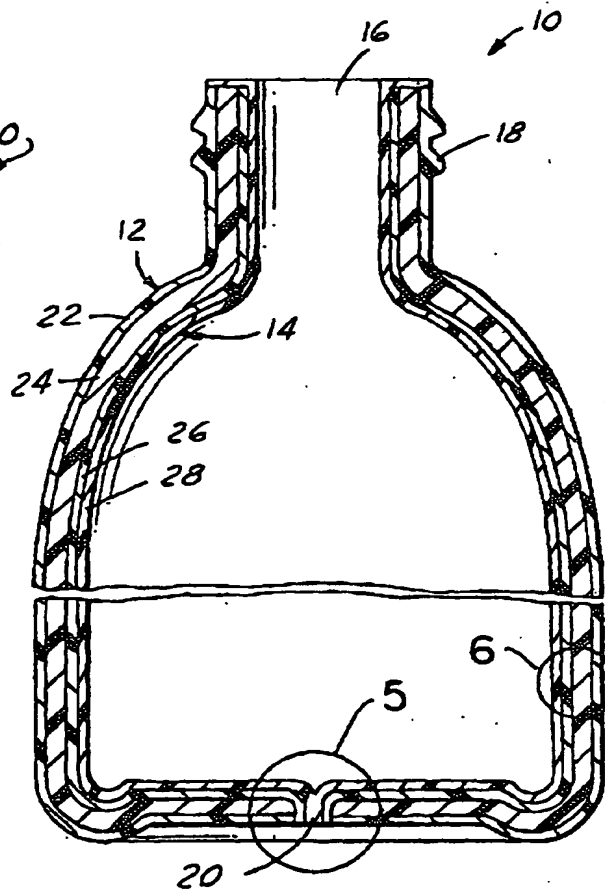


FIG. 4

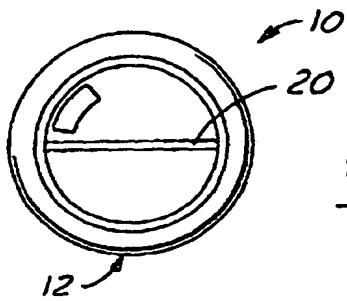


FIG. 3

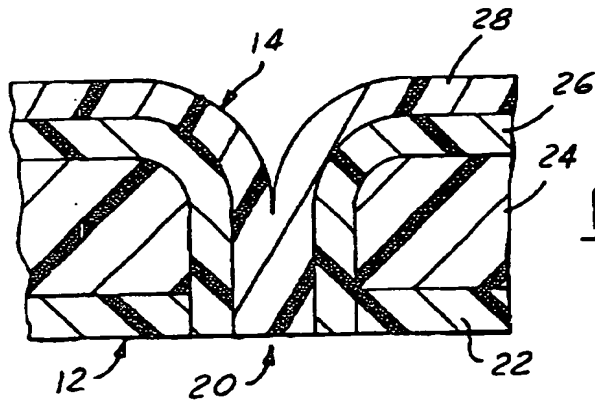


FIG. 5

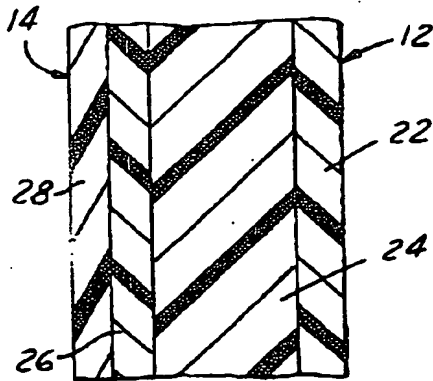


FIG. 6

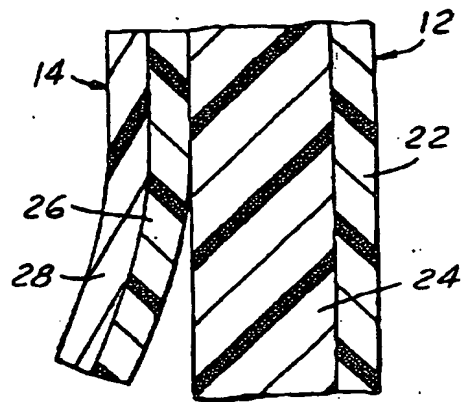


FIG. 6A